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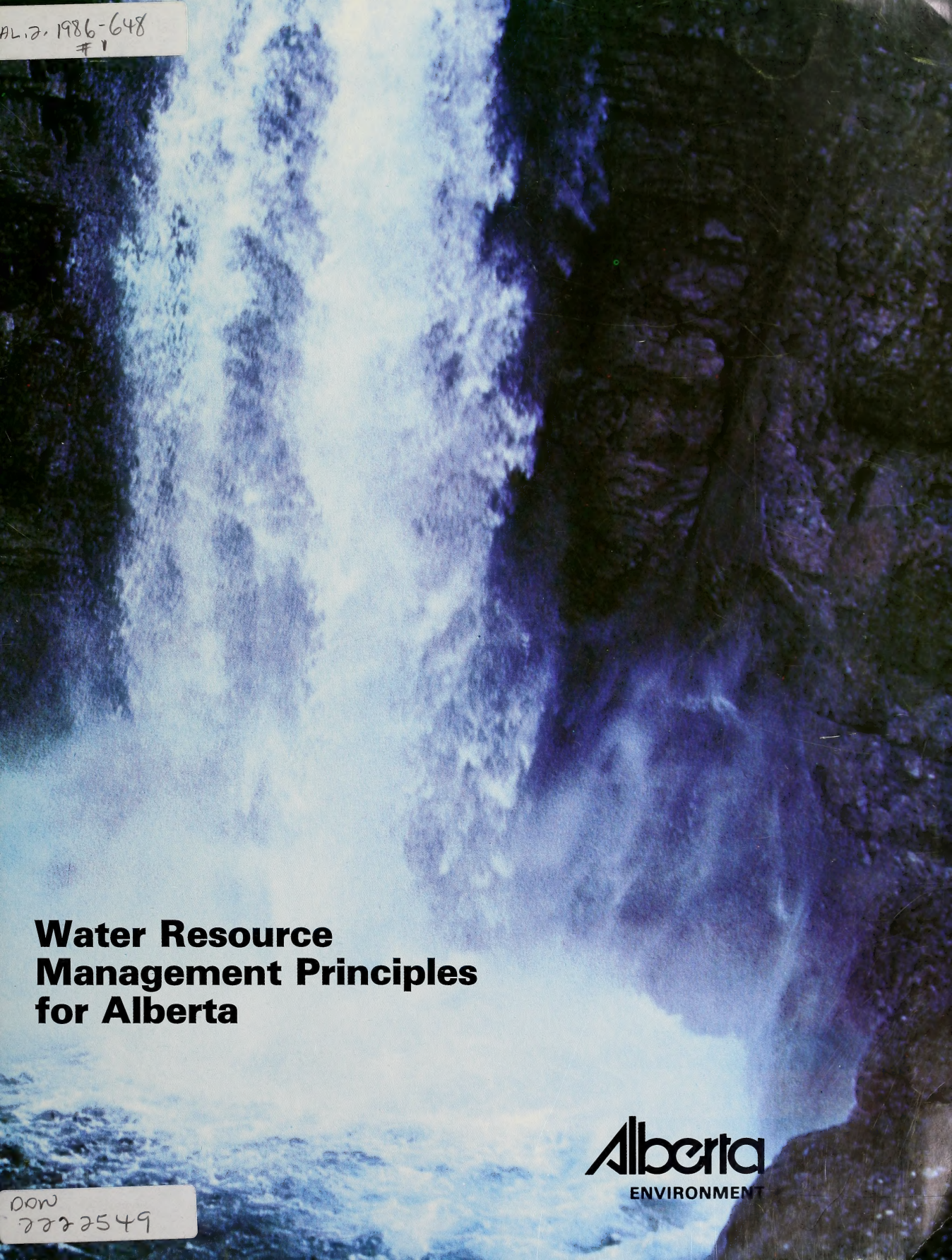

Water Resource Management Principles for Alberta

Alberta
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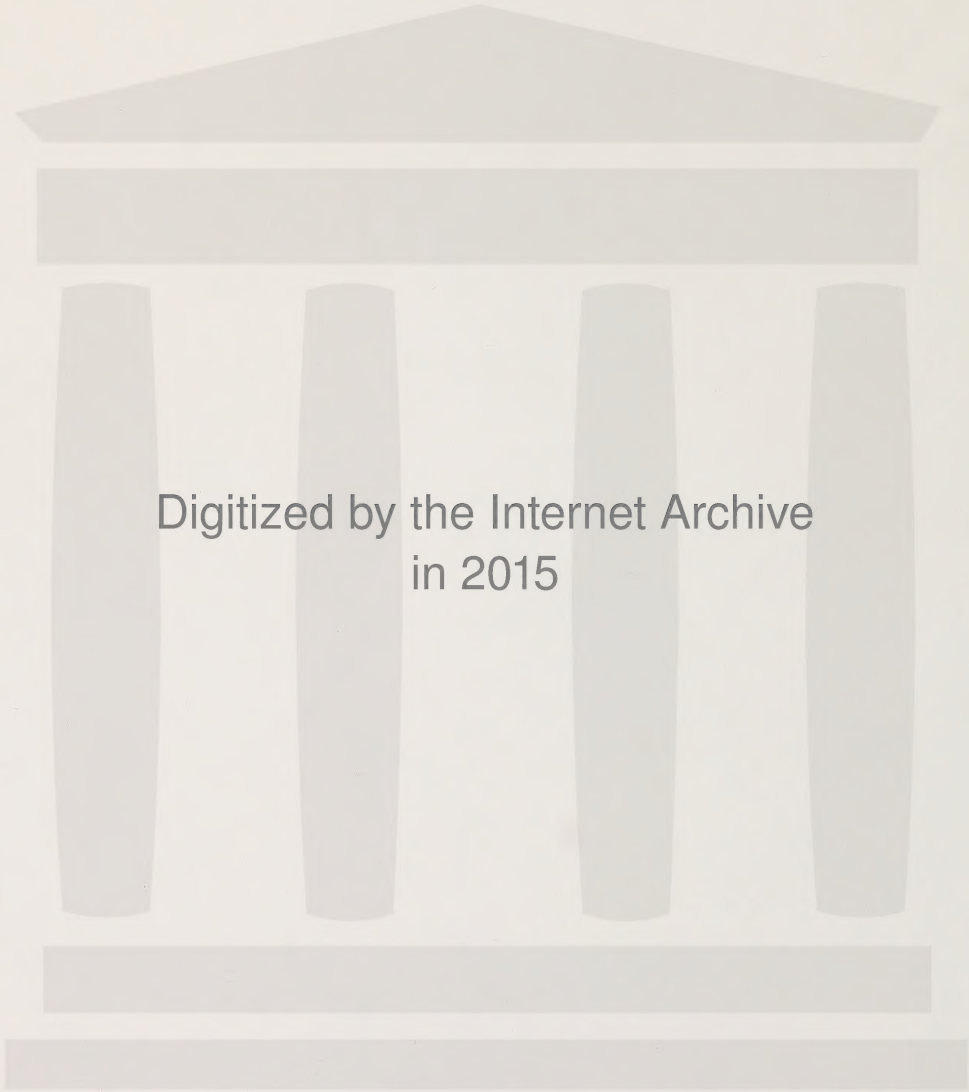
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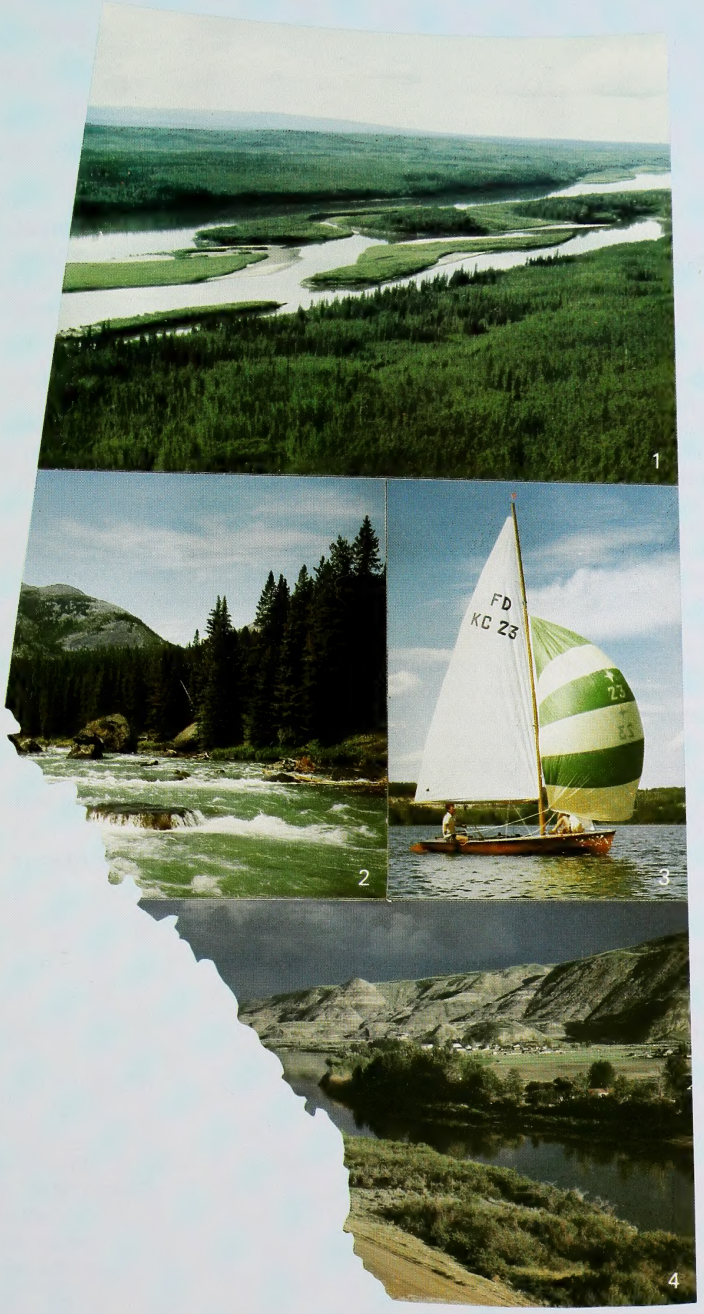

1. Northern Region
   - Peace River
2. Central-Western Region
   - Athabasca River
3. Central-Eastern Region
   - North Saskatchewan River
4. Southern Region
   - Red Deer River

Alberta
ENVIRONMENT

TO THE CITIZENS OF ALBERTA

This publication, *Water Resources Management Principles for Alberta,* has been prepared to assist in informing citizens of the Province on current water resource management guidelines. The importance of this renewable resource to Albertans cannot be overemphasized. In addition, Alberta is in the fortunate geographic position of controlling a significant portion of the headwaters of two of the largest river systems in Canada, the Saskatchewan-Nelson System which drains to Hudson Bay and the Mackenzie River System which drains to the Arctic. It is therefore necessary for Alberta to exercise wise management of its water resources in the interests of its citizens as well as those of downstream provinces and territories.

The principles contained in the publication, which have been developed over the past several years within the overall framework of Provincial goals and objectives, are being applied as guidelines for water resource management. In turn, these principles will be modified as the goals and objectives of the Province's citizens change.

I hope that you find the information in this publication both interesting and useful.

MINISTER OF THE ENVIRONMENT

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THE IMPORTANCE OF WATER

Water is one of Alberta's most important natural assets. It is a primary, vital natural resource and an important catalyst for balanced economic development.

Water is a resource essential to all human activity. It is renewable in nature; however, any source of water supply is not inexhaustible. Natural fluctuations in supply and overuse can result in temporary depletion.

A plentiful supply of good quality water, widely distributed, is a fundamental requirement for balanced economic growth and an expanding population in Alberta.

Water is a common heritage, the value of which must be recognized by all. Everyone has the duty to use water carefully and efficiently. Water knows no boundaries; consequently, water management demands interprovincial and international co-operation.

Water is a resource essential to all human activity.

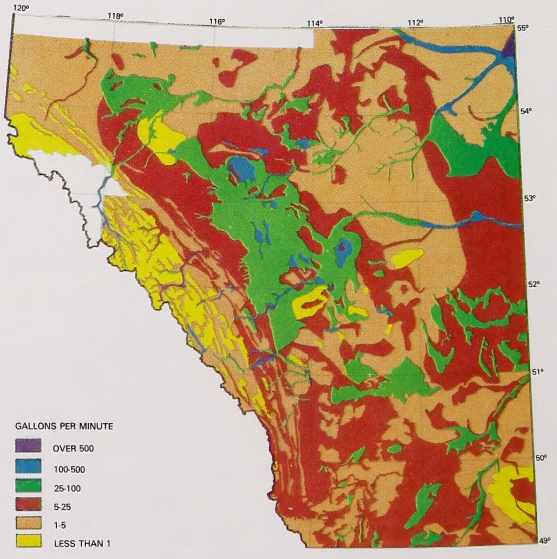
ALBERTA'S WATER RESOURCES

Water is found in relative abundance in many areas of the Province, although climatic differences result in considerable variation in supply from one region to another. Water originating in Alberta eventually reaches three different shores of the continent: the Arctic Ocean, Hudson Bay, and the Gulf of Mexico. Approximately 64% of the land area of Alberta lies within the Mackenzie River System, which discharges to the Arctic Ocean. The river basins that form the Mackenzie System in Alberta (the Athabasca, Peace, Slave, and Hay Rivers) account for 86.5% of mean annual river discharges leaving the Province. The Churchill and Saskatchewan-Nelson River Systems (the Beaver, North Saskatchewan, Battle, Red Deer, Bow, Oldman, and South Saskatchewan Rivers), which discharge to Hudson Bay, cover 35% of the Province's land area

but contribute only 13% of mean annual river discharges. The Milk River Basin, part of the Missouri/Mississippi River System, which discharges to the Gulf of Mexico, represents approximately 1% of the Province's land area, but yields considerably less than 0.5% of annual discharges.

Based on mean annual values, the streamflow originating within Alberta is 67.7 billion cubic metres (54.9 million acre feet) per year. An additional 67.3 billion cubic metres (54.6 million acre feet) per year flow into Alberta from British Columbia, Saskatchewan and the United States. Less than 10% of water originating in Alberta is withdrawn annually for the use of Albertans.

The other source of water supply is groundwater, which is highly variable in both quantity and quality depending on location.



GROUNDWATER YIELD MAP

BASIC WATER MANAGEMENT PROBLEMS

Alberta has a major responsibility in the management of its water resources because of the Province's geographic position as custodian of the headwaters of some of the nation's most important watersheds. Water management decisions made in Alberta have far-reaching implications for present and future generations in the Province and in many parts of Canada.

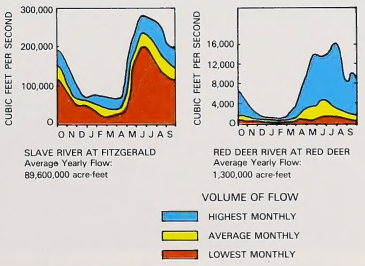
Alberta has a geographic imbalance between the area of greatest water supply and the area of greatest water demand. The southern half of the Province has approximately 15% of the total water supply but 80% of the total water demand. Water management problems in Southern Alberta are generally concerned with water supply, while flooding and erosion are major concerns in Northern Alberta.

Seasonal variations in flows also present water management problems. The river discharges vary from early summer peaks to very low winter flows. The high flows occur for a relatively short time but move enormous volumes of water. Without some form of flow regulation, these large volumes of water pass through Alberta unused and in some cases cause flood and erosion damage.

Eighty percent of Alberta's total water supply is in the northern part of the Province.

Water management problems in Southern Alberta are generally concerned with water supply.

These seasonal variations in flows are influenced mainly by the fact that the major rivers have their headwaters in the Rockies where the Eastern Slopes have relatively steep gradients and there is high precipitation (80-90% of Alberta's water originates in the mountains and foothills) and low retention of water in the soils. These factors combined with the particular climatic conditions of the region contribute to the wide variation in seasonal flows. The greatest seasonal variation as well as variations in the total discharge from year to year tend to occur in the southern rivers.



THE NEED FOR WATER MANAGEMENT PRINCIPLES

Rapid economic development and intensive urbanization, together with increased standards of living throughout Alberta, have resulted in high demands for water. These growing demands, including more stringent needs for high quality water in conjunction with natural fluctuations, have caused temporary shortages to occur, particularly in Southern Alberta. In certain areas, water has become a determining factor in the location of water-using industries. A shortage of water can be a limiting factor in the economic and social development of the Province.

In general, Alberta has a good supply of good quality water. However, water in its natural state may not be available in the right quantity and quality at the right place, at the right time.

Given the complexity of decisions on water allocation, and the potential for controversy between competing interests, objectives pertaining to the development and use of the resource need to be set by Government policy. Within the framework of overall Government policies, several management principles have been developed and are being applied.

Water can be a determining factor in the location of industry, such as this thermal power plant.

CURRENT ALBERTA PRINCIPLES RELATING TO WATER MANAGEMENT

1. BASIC OBJECTIVE

The water resources of Alberta are to be managed in support of the overall economic and social objectives of the Province. The Government's commitment to a program of balanced economic growth, the general welfare of Albertans, and the present and future quality of life are overriding considerations in water management. The supply of good quality water should not be a limiting factor in achieving these economic and social objectives.

2. WATER MANAGEMENT PHILOSOPHY

The philosophy of water management is based on:

- better use of available water resources
- augmentation of available water supplies, where necessary
- reduction of consumption.

The management strategy is being realized by obtaining from the water resources a maximum benefit for Albertans, while ensuring that the water is in a condition for beneficial use for an indefinite period, and at the same time preserving the existing natural environment from ecological and visual intrusions of physical water development works.

3. WATER RESOURCE PLANNING

In accordance with the water management philosophy, water resource planning must recognize the vital role played by water in economic and social development and the quality of life of Albertans.

The Alberta Government lists human consumption as first in their list of preferential water uses.

Water resource planning should be carried out within the framework of land use planning on the regional and Provincial scales.

In planning, it is essential that water quantity and quality be taken as two aspects of the same problem, and that surface water and groundwater be regarded as two forms of the same resource.

4. WATER RIGHTS AND LICENSING

While the ownership of all surface water and groundwater is vested in the Province, the right to use the water may be obtained through a licence issued to satisfy the needs of the user. There are, however, terms and conditions in every water use licence, designed to protect the source of supply and the rights of others. A licence signifies a priority of use, or prior right, as determined by date of issue. A water right remains valid as long as the specified use continues, but this right may be cancelled for waste, misuse, or non-performance of a condition of the licence.

5. PREFERENTIAL USE

As basic water management policy, the Alberta Government recognizes the importance of water for human consumption, for food production, for industrial use, and for other uses in that order. This order of preference is embodied in The Water Resources Act. Notwithstanding this provision, the Government may, under emergency conditions, suspend the operation of any water use licence and designate the other purposes for which such water may be used. Holders of licences affected by such an order are entitled to compensation for any losses incurred.

6. RIVER BASIN MANAGEMENT

The water resources of the Province are managed on a river basin system. That is, the entire river basin is considered as a unit for planning and management purposes. To meet this commitment, water resource planning is organized around the six major river basins in Alberta: the Oldman, the Bow, the Red Deer, the North Saskatchewan, the Athabasca, and the Peace. The planning approach is multi-purpose use of water. The waters in each major basin must be fully and efficiently utilized before inter-basin augmentation could be considered.

From a Provincial perspective, resolution of water resource management problems in the South Saskatchewan River Basin (Oldman, Bow, and Red Deer Systems) has the highest priority. Emphasis is therefore directed to the completion of a planning study of this Basin. This is the Basin that has the lowest level of precipitation and the greatest variability in water supply, coupled with the highest level of consumptive use. The objective of the analysis is the development of a management strategy for the South Saskatchewan River Basin, taking into account the needs of the Basin residents as well as the inter-provincial commitments. The intent is to manage the water resources in the Red Deer, Bow, and Oldman Rivers in concert with each other, not individually.

Water resource planning is organized on a river basin basis; the planning approach is the multi-purpose use of water.

7. IN-STREAM REQUIREMENTS

The concept of maintaining flows for in-stream beneficial uses is being expanded and strengthened. Fish resources in Provincial waters are protected as one of the recognized in-stream uses of water.

8. WATER CONSERVATION

The Government of Alberta encourages:

- development of a social consciousness toward the creation of individual obligations to use water without waste
- emphasis on greater water use efficiencies to reduce water losses and excessive use
- water conserving technology in irrigation
- water reuse where such is feasible.

The increasing cost of water management and the competing demands for a finite supply mean that water has an economic value and, in the long term, cannot be treated as a free commodity. At the present time, Provincial management costs are partially recovered through charges to specific categories of users. Broader user charges, designed to more fully recover capital costs and to establish the economic value of water, could be a potential management option toward promoting wise and efficient water use.

Through control and rehabilitation of major onstream headworks, Alberta is assuring a secure irrigation water supply.

The protection of fish habitat is included in the Provincial water management policy objectives.

9. MULTI-PURPOSE USE

Multi-purpose use is the underlying principle in all water resource planning and development. Planning and management especially consider the requirements of other resource development.

10. WATER FOR IRRIGATION USE

The Government's commitment to water for irrigation use incorporates many of the preceding policy principles. Recent amendments to the Water Resources Act placed irrigation use in the third priority use category, preceded only by domestic and municipal use. Through control and Provincially funded rehabilitation of major on-stream headworks, the Government is assuring a secure and continuous water supply to Irrigation Districts. Multi-purpose use of water impoundments and conveyance facilities is an underlying principle.

11. WATER POLLUTION PREVENTION

The Government is committed to a program to prevent or control water pollution. Water quality objectives, at least as stringent as those set nationally in Canada, have been defined and apply to all surface water bodies. The pollution control program also includes regulatory measures to protect the Province's groundwater resources. These standards are up-dated continually and enforced.

The principle that pollution must be controlled at its source is a key component of the Government's program. The Government's strategy is to be preventative. The assimilative capacity of receiver streams is, however, recognized.

The assimilative or self-purification capacity of watercourses must be regarded as a natural resource that is legitimate to use. Use of a stream as a receiving body for water discharge must never cause any break in the ecological cycles that ensure the self-purification process.

The Government of Alberta is committed to a program to prevent or control water pollution.

A reliable dam safety program is an essential element of water resource management.

12. DAM SAFETY

The risk to life, property, and the environment due to dam failure must be reduced to the lowest practical level. A Provincial Dam Safety Program has been established. Components include the review of plans and inspection during construction of new projects and the systematic inspection and monitoring of older structures. Two recent dam failures in Idaho and Georgia point to the need for such a program in Alberta. There are approximately 1000 dams in Alberta subject to inspection.

13. PUBLIC PARTICIPATION

Public participation is sought during the formulation of major water development projects. This provides the opportunity for public debate on all water resource planning and development likely to affect large segments of the population.

14. ENVIRONMENTAL IMPACT ASSESSMENT

An Environmental Impact Assessment is prepared for water management projects that have a major impact on the environment. This is in recognition of the need to preserve the amenities of our environment in the utilization of our water resources.

15. FLOOD PLAIN MANAGEMENT

As a basic principle, flood plain management is pursued in order to minimize potential flood damages. Management methods may include warning systems, zoning controls, control structures, purchase of flood-prone lands, and insurance programs. Alberta Environment strongly advocates that no development of a permanent or intensive nature be allowed on those portions of undeveloped flood plains that have a probability of one or more floods every 100 years.

16. COST SHARING

The Government is prepared to cost share with Local Authorities on all water management projects from which direct public benefits accrue.

Examples of such projects include flow regulation, lake stabilization, flood control and protection, and municipal water supply and sewage disposal facilities. The Provincial share of the cost ranges from 100% on projects of major Provincial benefit to smaller amounts on purely local projects. Guidelines and criteria have been established in several position papers. These particular programs are well publicized and known to Towns, Cities, Counties, Municipal Districts, and other Local Authorities who take full advantage of the technical and financial assistance provided.

The flooding at Fort McMurray in the spring of 1977 is an example of how development in a flood plain increases the toll of flood damages.

17. WATER DEVELOPMENT PROJECTS

The development of large water resource projects must take into account the primary effects caused by the physical presence of the project and the secondary, or induced, consequences resulting from the functioning of the project. This includes the matter of how unintended effects can be anticipated and how the design can be altered to mitigate or alleviate negative consequences. This is achieved by civil engineering projects being planned, designed, and monitored by interdisciplinary teams in order to produce a balanced environmental design, the objective being the development of projects that are, at the same time, harmonious with nature and beneficial to man.

18. WATER NOT FOR EXPORT

Alberta will not be party to any undertaking for the possible export of water beyond Canadian borders. The priority of water use and allocation is based firstly on Provincial, secondly on interprovincial, and finally on national considerations, and will not be influenced by international considerations.

Trees were planted at Bigelow Dam site to enhance the reservoir's environment.

19. INTERGOVERNMENTAL CO-OPERATION

It is the policy of the Government of Alberta to co-operate fully with other Provincial Governments and the Government of Canada in the regulatory aspects of interprovincial waterways and in joint activities to provide the physical data necessary for water management decisions. Current and recent examples of such co-operation include participation in the activities of the following:

- International Joint Commission
- Prairie Provinces Water Board
- Mackenzie River Basin Committee
- Saskatchewan-Nelson Basin Board
- Co-operation with British Columbia regarding potential hydro power development on the Peace River.

20. MANAGEMENT OF INTERPROVINCIAL WATER

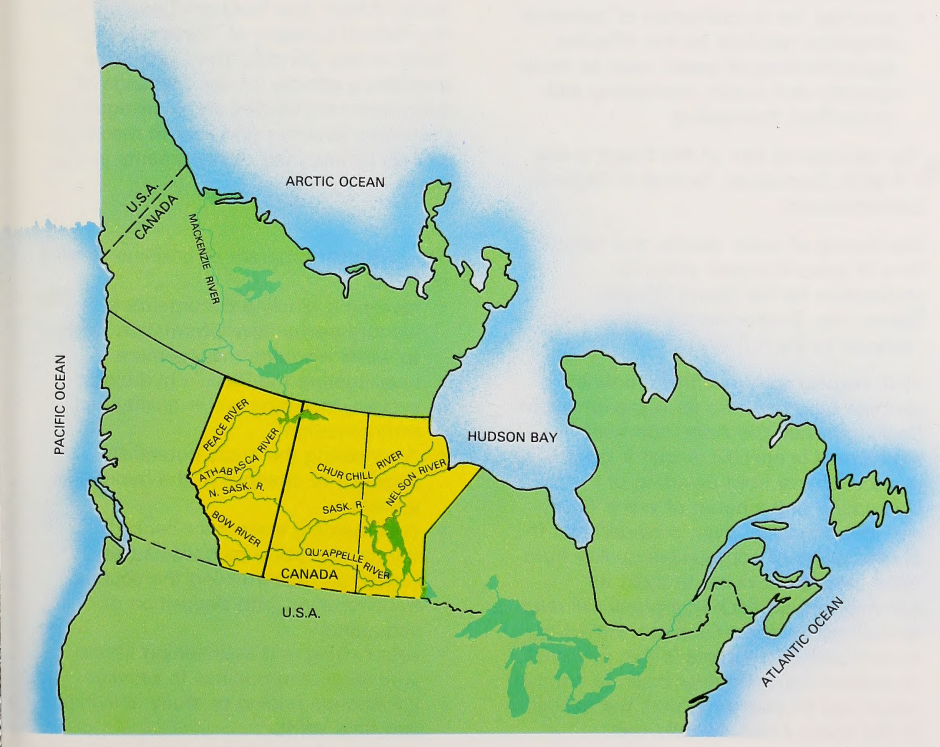
While it is desirable to measure our overall water resources on an interprovincial basis and to develop projects of a joint benefit, Alberta needs to know what water will be available for its internal use. The use of water within the Provincial Boundary is entirely a matter of the judgment of Alberta, provided that such use does not unduly interfere with use in other provinces or contravene the provisions of any existing water apportionment agreement.

PRAIRIE PROVINCES MASTER AGREEMENT ON APPORTIONMENT

On October 30, 1969, Canada, Alberta, Saskatchewan, and Manitoba entered into an agreement to apportion the water in rivers that flow from west to east across interprovincial boundaries.

In general terms, the Master Apportionment Agreement permits Alberta to consume from each such river a quantity of water equal to one half of the natural flow of water originating in or flowing through the Province. A quantity of water equal to the remaining one half of the natural flow must be permitted to pass downstream into Saskatchewan.

The Master Agreement reconstitutes the Prairie Provinces Water Board (P.P.W.B.), a body first established in 1949. The P.P.W.B., which comprises two members appointed by Canada and one member appointed by each of the three provinces, is responsible for the administration of the Master Agreement.



EXAMPLES OF INTER-GOVERNMENTAL CO-OPERATION

The duties of the Board include

- the review, collation, and analysis of streamflow data, and the preparation of reports and recommendations on apportionment
- the review of water quality problems and the preparation of recommendations for appropriate management approaches for their resolution
- the development of recommendations on other water matters
- the promotion of integrated development of water resources of interprovincial streams
- the preparation of factual reports on disputes arising out of water apportionment
- ensuring the co-ordination of technical programs required for the effective apportionment of water, such as water quantity and quality monitoring and streamflow forecasting.

The operational arm of the Board is the P.P.W.B. Secretariat, located in Regina, Saskatchewan.

Monitoring of water quality and natural flow at apportionment points is undertaken by the Inland Waters Directorate, Environment Canada, and reported to the P.P.W.B.

With respect to how and from what sources Alberta fulfills its commitment to Saskatchewan, the Apportionment Agreement is specific in that it does not restrict Alberta from diverting or consuming any amount of water from any interprovincial river, provided that it diverts water of comparable quality from other streams or rivers to meet its commitment on each interprovincial river as defined for apportionment. However, current policy in Alberta is that any new diversions from one river basin to another would not be permitted until the needs of the donor basin are fully met.

MACKENZIE RIVER BASIN COMMITTEE

The Mackenzie River Basin, which encompasses parts of the two territories and three provinces, is the largest river system in Canada. In order to learn more about the resource potential of the Basin, the Federal and Provincial Governments signed a four-year study agreement in 1978.

Co-ordinating these studies is the Mackenzie River Basin Committee, which comprises senior government officials representing British Columbia, Alberta, Saskatchewan, the Northwest Territories, the Yukon, the Federal Department of Indian Affairs and Northern Development, the Federal Ministry of Transport, and Environment Canada. The Committee provides a vehicle for the exchange of information on studies and investigations pertaining to water and related resources as well as intended developments in the Basin.

The four-year program of baseline studies includes

- reviewing pipeline documents to identify useful new information relating to water resource management
- investigating the Basin's hydrologic system, including water quality and sedimentation
- determining the areas potentially sensitive to changes in the hydrologic system
- documenting current ice-caused floods, assessing past ice-caused floods, and determining the sources, transportation, and deposition of sediments
- establishing and maintaining liaison with local communities to provide information related to study activities and field work.

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